Marked up copy of amended English Translation, which shows changes made both to the specification and the claims.

[Patent] Claims [for "Intercommunication" and "Multi-Link Controller"]

1. (amended) An [E]electrical drive system for the synchronised adjustment of a plurality of rotatable axles or further, also linearly movable functional parts [(3)] of devices and machines, in particular printing machines, in terms of their position, speed or acceleration, with a plurality of drive units [(DRC)] controlled using computer assistance, which are connected to one or more functional parts [(3)] for their adjustment, and with a plurality of drive networks, which each have a plurality of the drive units [(DRC)] as network nodes and are allocated to some or a group of the functional parts [(3)], wherein, inside at least one of the drive networks, its nodes or drive units [(DRC)] are arranged in accordance with the master/slave principle and are respectively connected to one another in a ring structure through a communication [channels (1) and/or a communication] system, and at least one node [(SDC)] of a drive network is coupled in a ring structure with one node [(SDC)] of another drive network, likewise in accordance with the master/slave principle, through inter-communication [channels (1) and/or an inter-communication] system [or network].

2. (amended) An [E]electrical drive system for the synchronised adjustment of a plurality of rotatable axles or further, also linearly movable functional parts [(3)] of devices and machines, in particular printing machines, in terms of their position, speed or acceleration, with a plurality of drive units [(DRC)] controlled using computer assistance, which are connected to one or more

functional parts [(3)] for their adjustment, and with a plurality of drive networks, which each have a plurality of the drive units [(DRC]) as network nodes and are allocated to some or a group of the functional parts [(3)], wherein, inside at least one of the drive networks, its nodes or drive units [(DRC)] are communicatively coupled with one another, and with a plurality of inter-communication networks, whose nodes [(SDC)] are also communicatively coupled with one another and simultaneously belong to different drive networks, and furthermore with a multi-link controller [(MLC)], which is provided with communication components [(SIM)], each as respective nodes of the intercommunication networks, and is designed using program and/or circuit technology for their [management, connection, interlinking and/or] coupling with one another.

3.(amended) A [D]drive system according to Claim 2, [characterised in that] wherein the drive and intercommunication networks are arranged using a preferably serial ring structure and are organised in accordance with the master/slave principle.

4.(amended) A [D]drive system according to Claim 3, [characterised in that] wherein the communication component [(SIM)] is designed in the scope of the master/slave principle as a communication master of the respective intercommunication network.

5.(amended) A [D]drive system according to Claim 2, [3 or 4, characterised in that] wherein the communication components [(SIM)] are produced with serial interfaces

[(SIM)] and are controlled by at least one processor [(DSP)].

6.(amended) A [D]drive system according to [one of] Claim[s 2 to] 5, [characterised in that] wherein the communication component [(SIM)] is [designed, interlinked or] provided with functions of a communication manager [(COM_MANAGER) preferably without undertaking direct drive functions].

7.(amended) A [D]drive system according to [one of] Claim[s 2 to] 6, [characterised in that] wherein the plurality of intercommunication networks are arranged according to a star structure with the multi-link controller [(MLC)] as the star centre.

8.(amended) A [D]drive system according to [one of] Claim[s 2 to] 7, [characterised in that] wherein at least one intercommunication network is designed for data transmission synchronously with a clock of the multi-link controller [(MLC)].

9. (amended) A [D]drive system according to [one of] Claim[s 2 to] 8, [characterised in that,] wherein in at least one of the intercommunication networks, [one or more] at least one of the nodes [are] is configured using [program and/or circuit technology as communication masters (M1, M2, M3) and/or] a master [computers] for other intercommunication networks, and their communication control [and/or command] signals are delivered to the other intercommunication networks by the multi-link controller [(MLC), optionally after filtering or other processing].

10. (amended) A [D]drive system according to claim 9 [one of the preceding claims, characterised by a design, using program and/or circuit technology, such that the] wherein setpoint position, speed and[/or] acceleration values are distributed[, optionally with associated control and status information,] to one or more of the drive networks via the inter-communication system or network.

11. (amended) A [D]drive system according to Claim 10, [characterised in that] wherein the control information contains logical allocation of one or more drive units [(DRC)] to one of the [drive networks and/or intercommunication] networks.

12. (amended) A [D]drive system according to [one of] Claim[s 2 to] 11, [characterised by a design, using program and/or circuit technology, of the multi-link controller (MLC) such that an command and/or data] wherein a transfer that [fully or] at least partially [influences or] controls the intercommunication networks takes place via [it] the multi-link controller.

13.(amended) A [D]drive system according to Claim 12, [characterised by a design, using program and/or circuit technology, of the multi-link controller (MLC) such that] wherein all information for the allocation of one of the drive units [(DRC)] to a respective drive network is transferred via [it] the multi-link controller to each intercommunication network.

14. (amended) A [D]drive system according to Claim 13, wherein at least a plurality of the drive networks are designed, using program and/or circuit technology, in accordance with the master/slave principle, respectively

with a communication master [(SDC)] which a forms a node of an intercommunication network, and the multi-link controller [(MLC) is designed, using program and/or circuit technology, in such a way that] has all drive units [(DRC)] of this intercommunication network [are] each respectively allocated via it to one of the communication masters [(SDC)].

15. (amended) A [D]drive system according to [one of] Claim[s 2 to] 14, [characterised in that] wherein a node [(SDC)] of at least one of the intercommunication networks is [designed, using program and/or circuit technology,] both as a communication master for this intercommunication network, for its individual operation without coupling with the multi-link controller [(MLC)], and as a communication slave for coupling with the multi-link controller [(MLC)] that operates as a communication master.

16. (amended) A drive system according to claim 15 wherein the [M]multi-link controller [(MLC) for an electrical drive system according to one of the preceding claims, characterised by] further comprises a plurality of communication components [or interfaces (SI_ISR1, SI_ISR2...)] respectively configured as communication masters for external networks, and a processor [(DSP)] that controls them.

17. (amended) A drive system according to claim 16 wherein the [M]multi-link controller [(MLC) according to Claim 16, characterised in that the] includes communication interfaces [(SI_ISR1, SI_ISR2...) are]

designed for synchronous and[/or] serial data transmission.

18. (amended) A drive system according to claim 16 wherein the [M]multi-link controller [(MLC) according to Claim 16, characterised in that the] includes a processor [(DSP) is] provided with [a] program code [element or one or more software modules (DTA_DIST_MGR)] for the distribution, routing of data from one communication interface to another [and/or for the filtering or other processing of this data for the other communication interface and/or with one or more preferably serial interfaces for communication with a superordinate control or diagnosis device (PLC) and/or for other data input and/or output].

19. (amended) A drive system according to claim 18 wherein the [M]multi-link controller [according to Claim 18, characterised by] further comprises one or more modules [(COM_MANAGER)] that [regulate and/or] control the communication interfaces, for communication management with these communication interfaces.

20. (amended) A drive system according to claim 19 wherein the [M]multi-link controller [(MLC) according to one of Claims 16 to 19,] further comprises [characterised by a design and/or instrument, using program and/or circuit technology, for] individual parameterisation from an external master data source.

21. (amended) A drive system according to claim 20 wherein the [M]multi-link controller [(MLC) according to one of Claims 16 to 20, characterised by] further comprising a reception storage unit for data [from the

and/or to] between the communication interfaces [(SI_ISR1, SI_ISR2...)].

22.(amended) A drive system according to claim 20 wherein the [M]multi-link controller [(MLC) according to one of Claims 16 to 20, characterised by] further comprises an instrument, using program and/or circuit technology, for converting one communication protocol of a first intercommunication network into another communication protocol of a second intercommunication network.

23. (amended) A drive system according to claim 2 and futher comprising a [D]drive synchronisation control unit as nodes of an intercommunication network for an electrical drive system [according to one of the preceding claims, characterised by] having at least one communication interface [(SI_ISR)] and at least one processor [(DSP)] that controls it and is provided with the following functional modules:

- a master axis module [(VSA_MGR)], designed to receive, to generate and/or route data and/or commands for a virtual master axis via the at least one communication interface [(SI_ISR)]
- a data distribution module [(DTA_DIST_MGR)], which is designed for controlling a data and/or command flow via the least one communication interface [(SI_ISR)] with one of the networks, in particular the intercommunication network.

24. (amended) A drive system according to claim 23 wherein the [S]synchronisation control unit [according to Claim 23, characterised in that] has the processor [(DSP) is] also provided with a second communication interface [(SI_DRV)] and a drive communication module

[(DRV_COM_MGR)] that can be coupled with it and is designed for controlling a data and/or command flow via the second communication interface [(SI_DRV)] with one of the drive networks.

25. (amended) A drive system according to claim 24 wherein the [S]synchronisation control unit [according to Claim 24, characterised in that the] has a master axis module [(VSA_MGR) is] designed for access to the two communication interfaces [(SI_DRV, SI_ISR)] for the purpose of bidirectional data and/or command interchange between two networks.

26. (amended) A drive system according to claim 25 wherein the [S]synchronisation control unit [according to Claim 24 or 25, characterised in that the] has a processor [(DSP) is] also provided with a third communication interface [(SI_PLC)], with which the drive communication module [(DRV_COM_MGR)] and/or data distribution module [(DTA_DIST_MGR)] for organising a[n] command and/or data flow between one of the drive and/or intercommunication networks, on the one hand, and a further network, in particular control network with asynchronous data interchange, on the other hand, can be coupled.

27. (amended) A drive system according to claim 26 wherein the [S]synchronisation control unit [according to Claim 26, characterised in that the] has a drive communication module [(DRV_COM_MGR) is] designed for access to the second and third communication interfaces [(SI_DRV, SI_PLC)] for the purpose of bidirectional data and/or command interchange between two networks.

28. (amended) A drive system according to claim 26 wherein the [S]synchronisation control unit [according to Claim 24 or 26, characterised in that the] has a data distribution module [(DTA_DIST_MGR) is] designed for access to at least two of the first, second and third communication interfaces [(SI_ISR, SI_DRV, SI_PLC)] for the purpose of bidirectional data and/or command interchange between at least two of the different networks.

29. (amended) A drive system according to claim 28 wherein the [S]synchronisation control unit [according to one of Claims 23 to 28, characterised in that the] has a processor [(DSP) is] provided with one or more modules [(COM_MGM)] that regulate and/or control the first, second and third communication interfaces, [(SI_DRV, SI_ISR, SI_PLC),] for communication management via these communication interfaces[(s)].

30. (amended) A drive system according to claim 29 wherein the [S]synchronisation control unit [according to one of Claims 23 to 29, characterised in that the] has a data distribution module [(DTA_DIST_MGR)] which comprises filtering or other processing functions for data and commands from at least one communication interface for at least one other communication interface.

ABSTRACT OF THE DISCLOSURE

An electrical drive system for the synchronised adjustment of rotatable axles or linearly movable functional parts in particular for printing machines, in terms of their position, speed or acceleration. Drive units are controlled using computer assistance and are connected to one or more functional parts for their adjustment. A plurality of drive networks, which each have a plurality of the drive units as network nodes, are allocated to some or a group of the functional parts. Inside at least one of the drive networks, its nodes or drive units are arranged in accordance with the master/slave principle and are respectively connected to one another in a ring structure through communication channels and/or a communication system. At least one node of a drive network is coupled in a ring structure with one node of another drive network, likewise in accordance with the master/slave principle, through inter-communication channels and/or an inter-communication system or network.

Last printed 01/29/02 6:22 PM

5 \\KFMPLNX0\PUBLIC\client.docs\g\gotz-czo\i31 multi link controller\application u s format markup.doc